

SPoRT GOES-R Proving Ground Activities

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GOES-R Proving Ground Annual Meeting
17-19 May 2011, Boulder, Colorado

Webpage: <http://weather.msfc.nasa.gov/sport>

Blog: <http://weather.msfc.nasa.gov/sportblog>



GOES-R Proving Ground Annual Meeting, 17-19 May 2011, Boulder Colorado



Short-term Prediction Research and Transition (SPoRT)

SPoRT is focused on transitioning unique NASA observations and research capabilities to the operational weather community to improve short-term weather forecasts on a regional and local scale.

- Mainly work with WFOs in Southern Region
- SPoRT activities began in 2002, first products to AWIPS in February 2003

SPoRT Paradigm

- Match observations to forecast challenges
- Develop and assess solution in “testbed” environment
- Transition solution to decision support system
- Develop/conduct training, product assessment and impact

Benefit

- Demonstrate capability of NASA experimental products to weather applications and societal benefit
- Prepares forecasters for use of data from next generation of operational satellites (NPP/JPSS, GOES-R)



Partnerships and End Users

Partnered with NOAA / University community

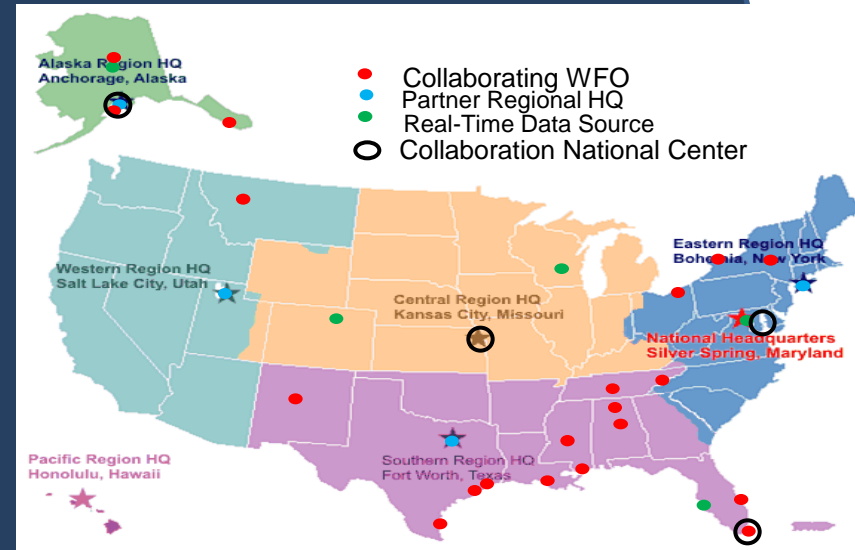
- Access to real-time experimental data / products
- NASA instruments data and model products
- Collaborations with NOAA CIs for GOES-R proxy products

End users

- Regular interactions with 20 WFOs
- National Centers and “testbeds”
- Private sector users

Data / transition / dissemination

- Suite of over 30 satellite derived products, analyses, forecast products
- Public ftp, Local Data Manager (LDM)
- AWIPS, NAWIPS, AWIPS2, Google Earth, EVCM



GOES-R Products - Baseline / Option 2

Pseudo Geostationary Lightning Mapper P-GLM Products

- Flash extent density and maximum density products derived from ground-based LMA data (4 networks), AWIPS and AWIPS II
- Similar to AWG optical proxy GLM product (not yet available)
- SPC/HWT/ Spring Experiment

GOES-MODIS Hybrid Product

- replicates spatial resolution of selected ABI channels
- derived from MODIS imagery combined with GOES-East 15 minute imagery for animation, AWIPS
- 8 WFOs for evaluation

Convective Initiation Product – obtained from AWG

- Reformat and disseminate to SPC/HWT/ Spring Experiment
- AWIPS and AWIPS II

GOES-R Products R3 / Decision Aids

Red-Green-Blue (RGB) channel composites simulating ABI capabilities – more information than a single channel

- Collaboration with CIRA and CIMSS for product development
- Generated from MODIS, SEVIRI, GOES Sounder, simulated ABI radiance data
- SPoRT disseminates RGB products to NHC, SPC, HPC, OPC, others
- Focus on specific products and forecast problems

High-resolution SST Composite

- 2-4x daily AMSR-E and MODIS derived SSTs combined contiguous field
- No planned proxy AWG product for ABI
- AWIPS, GRiB for model ingest, WFOs, SPoRT WRF for SPC/HWT Spring Experiment LFA

Lightning Forecast Algorithm (LFA)

- Total lightning forecast product
- Based on forecast model microphysics
- Aids in GOES-R GLM lightning data assimilation

PG Demonstration Activities

Transition products to AWIPS II – develop Edex and CAVE plug-ins for SPoRT products

GOES-MODIS Hybrid to WFOs - assessments

Products to National Centers for their Proving Ground activities – NHC, OPC, HPC, AWC

HWT/SPC /Proving Ground Spring Experiment participation

Training – variety training for end users, many in NWS Learning Management System

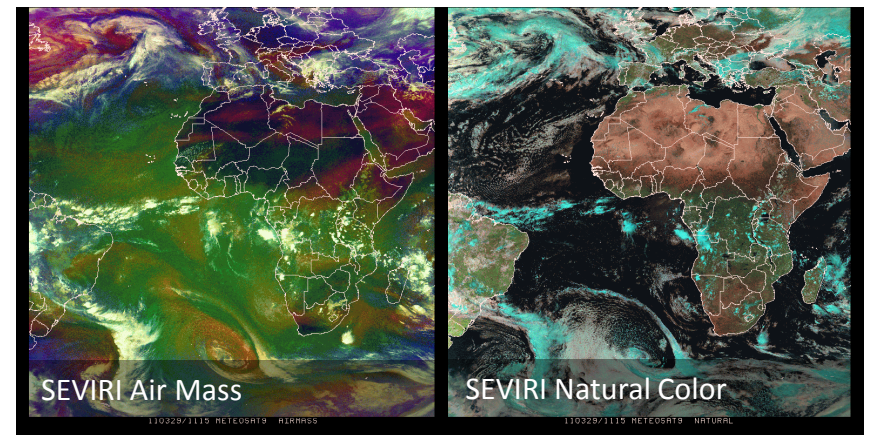
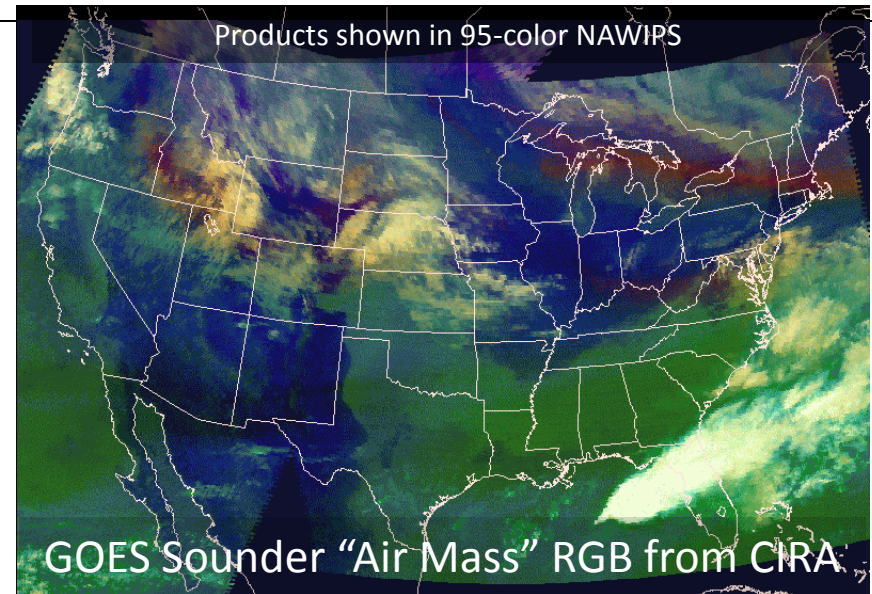
Envirocast Collaboration Module (EVCN)

- Wrapper around Google Earth to increase collaboration between forecasters and decision makers, AR demo last month

Multispectral Data as “RGB” Imagery

Suite of multispectral channel composites to enhance identify features not readily apparent in single channel imagery

- based upon EUMETSAT guidelines for consistency with SEVIRI data
- provided to partners in AWIPS and NAWIPS systems
- collaborate with CIRA to demonstrate RGB products over CONUS using the GOES Sounder
- product available for use in NAWIPS at NHC for Joint Hurricane Testbed activities



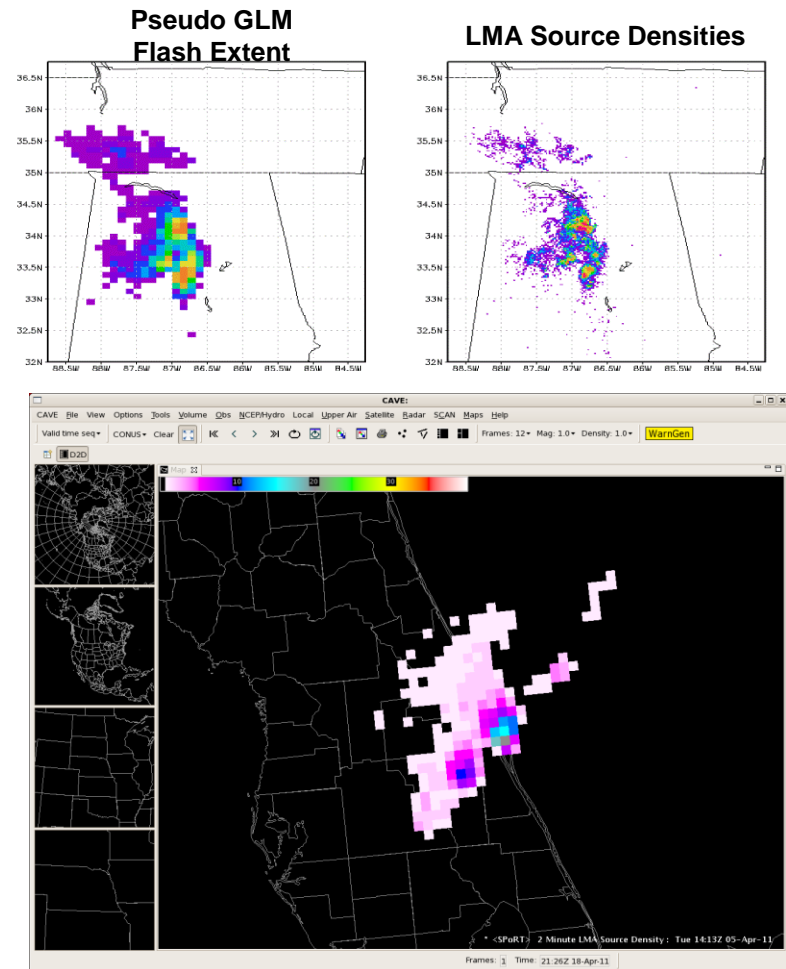
Spring Experiment: Pseudo-GLM

SPoRT providing the Pseudo Geostationary Lightning Mapper

- Mimics future GOES-R GLM
- 8-km resolution
- Flash extent density product
- produced from 4 LMAs

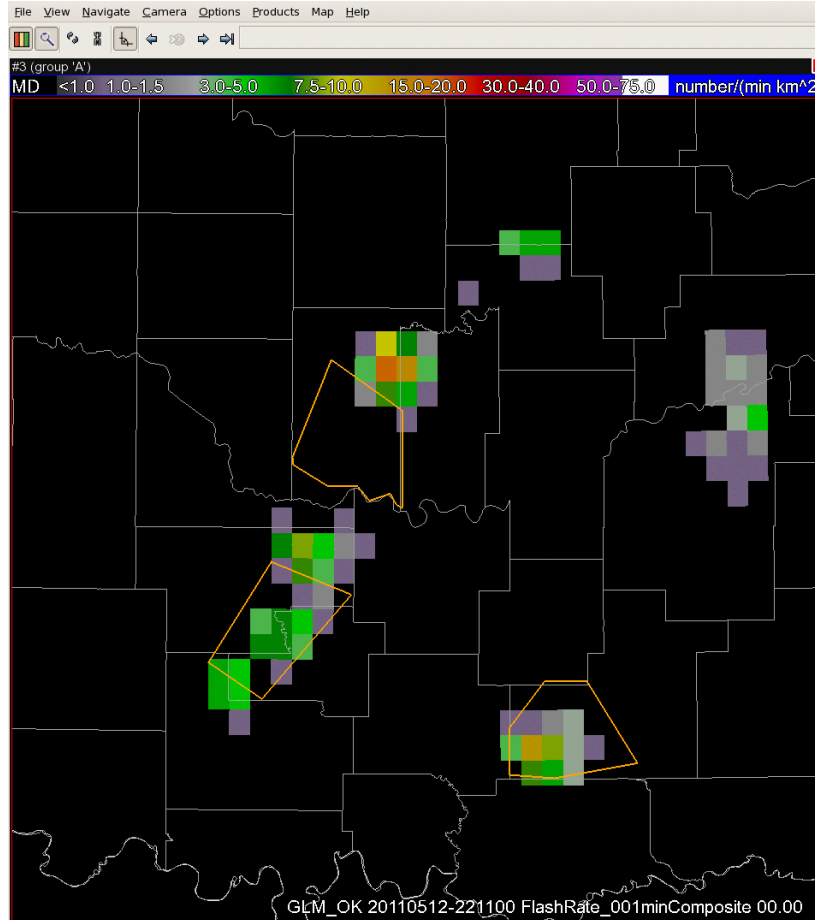
Provided to the Spring Program

- Emphasis on total lightning uses
 - o situational awareness and lightning safety
 - o improved warnings
- Educate forecasters on GLM
- Receive forecaster feedback on best visualization approaches

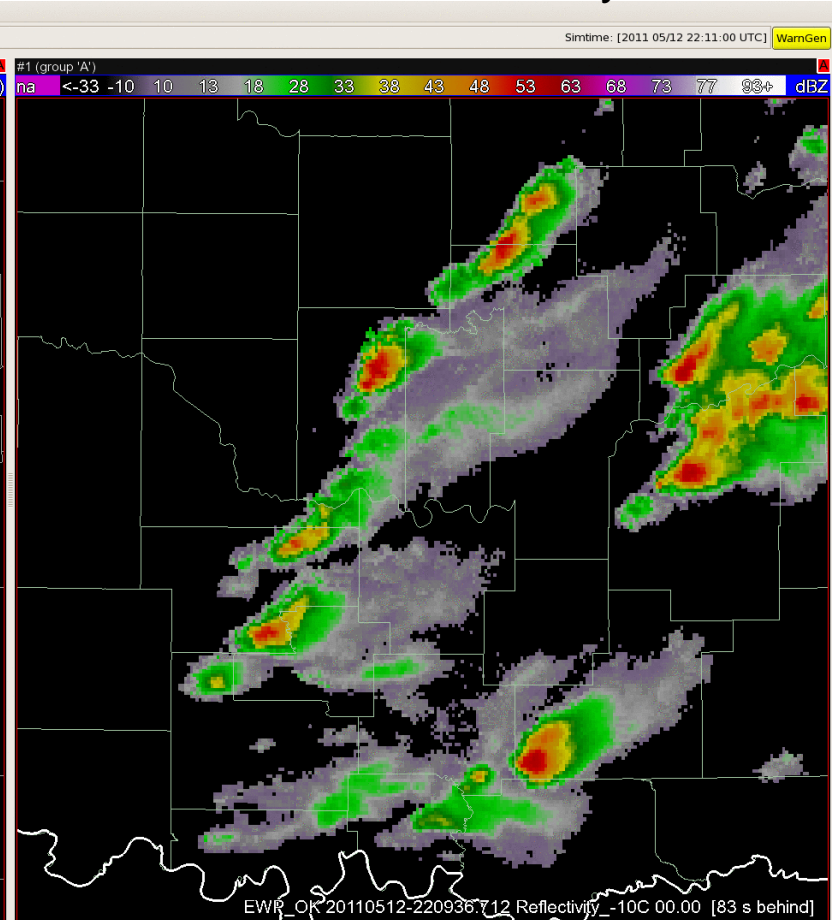


Lightning Jump Associated with Developing Severe Storm

Pseudo GLM



Radar Reflectivity



GOES-MODIS Hybrid

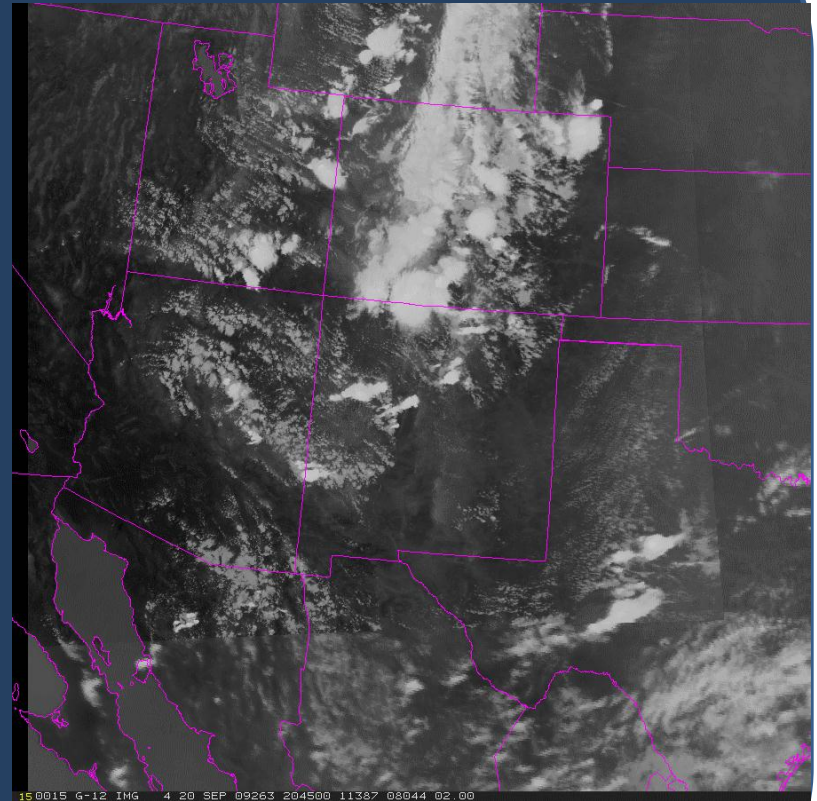
Product to simulate or serve as
“proxy” for GOES- R ABI

ABI will have advanced imaging capabilities

- 16 multispectral channels similar to MODIS
- Spatial and temporal resolution improvements over GOES Imager

While MODIS can be used to replicate spatial and spectral resolution of ABI, the polar orbit limits its temporal resolution

Combine MODIS and GOES to simulate GOES-R ABI capabilities

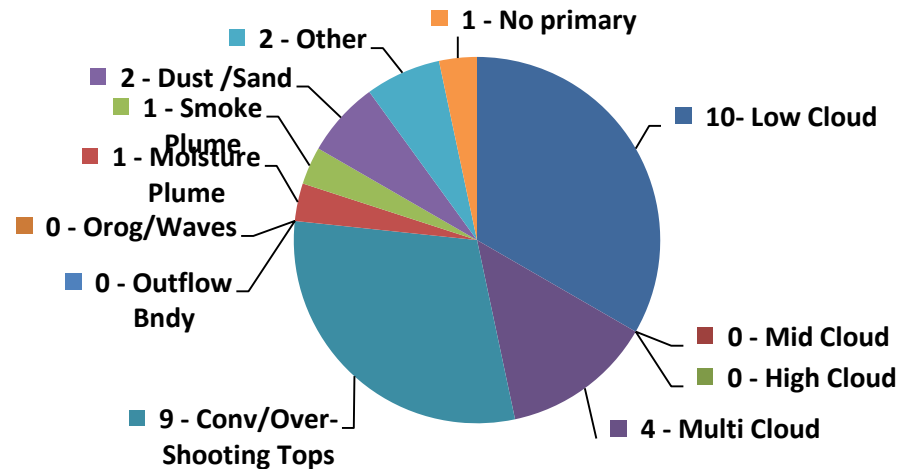


Hybrid Imagery Feedback Results 4/14 to 5/16

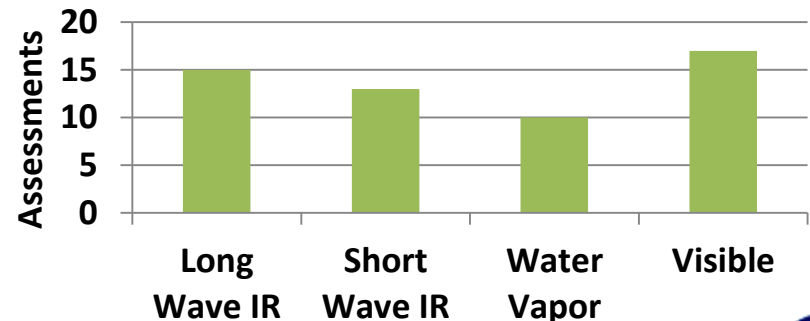
(8 day break due to loss of power from tornadic events)

- 30 total survey/ evals, 4 blog posts
 - from 7 WFOs and SMG
- 2/3 of users providing feedback have high experience/knowledge regarding satellite imagery in operations.
- IR, SW, WV, and Vis. imagery included in at least 10 assessments each (multiple products can be included in single assessment)
- 21 said the imagery had some to large impact, while 9 indicated little impact
 - generally a normal distribution with most in the “some” category
 - “expert” users mostly indicated some to little impact in cases examined with occasional high impact,
 - less experienced users had ~equal amount of high and low impact cases
- 26 indicated that they recommended the product to other forecasters
- 21 indicated that they zoomed into features vs. using a large-scale view
 - look at mesoscale features vs synoptic

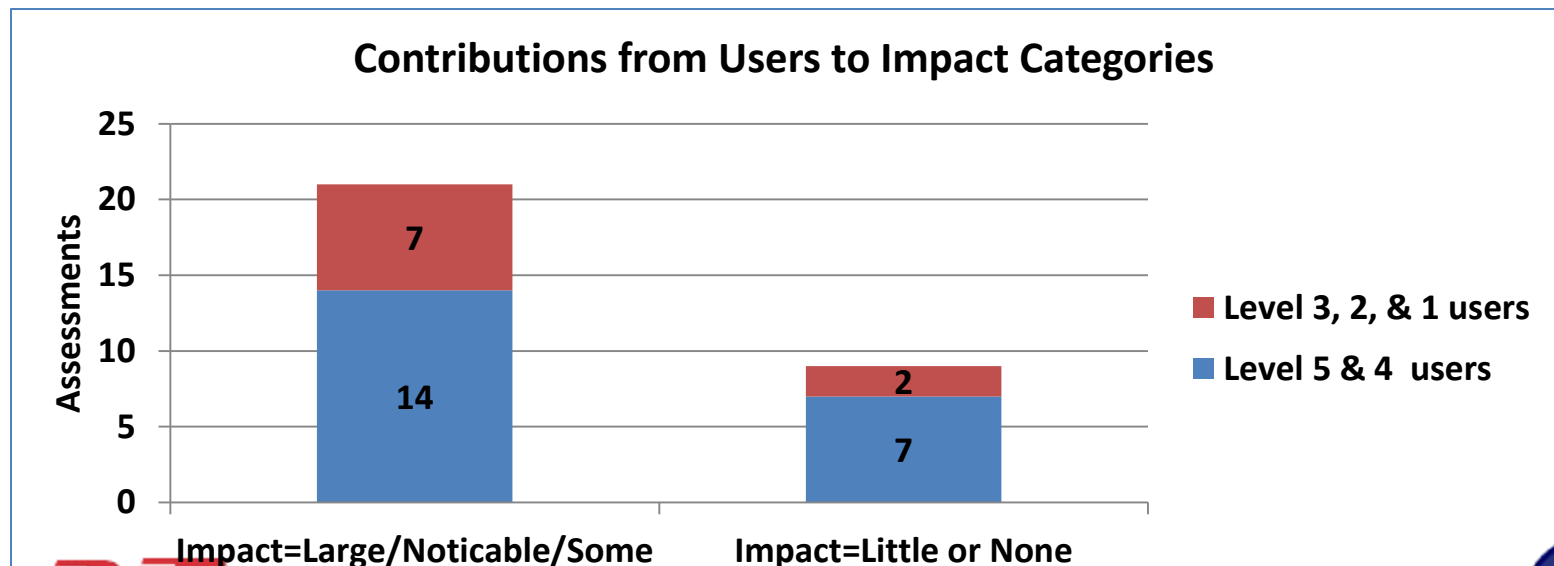
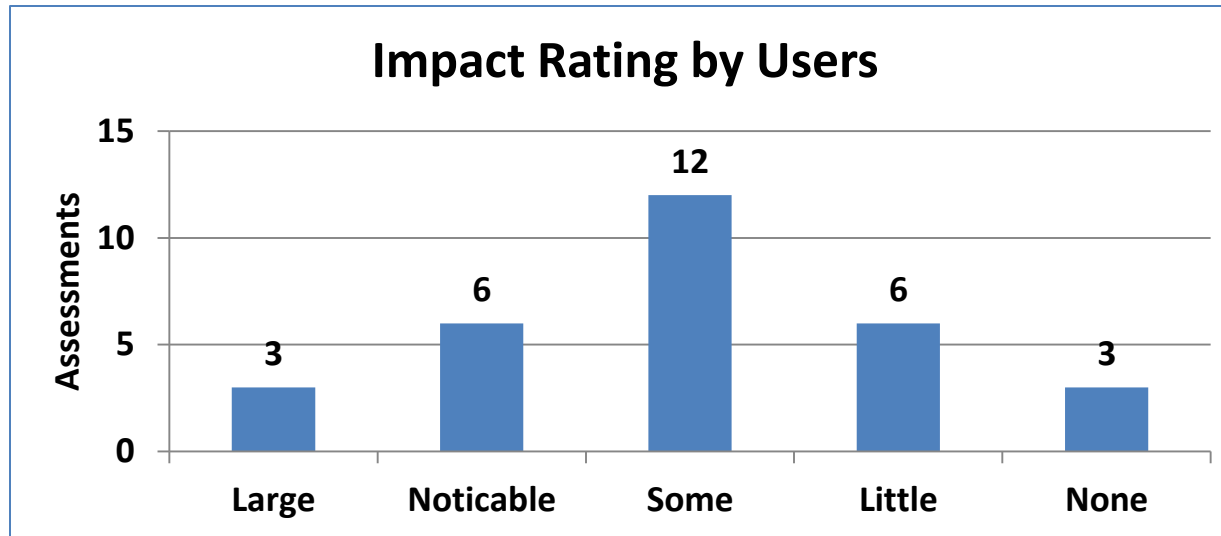
Features Examined During Hybrid Assessment



Reviews per Hybrid Product



User Feedback – Hybrid Impact



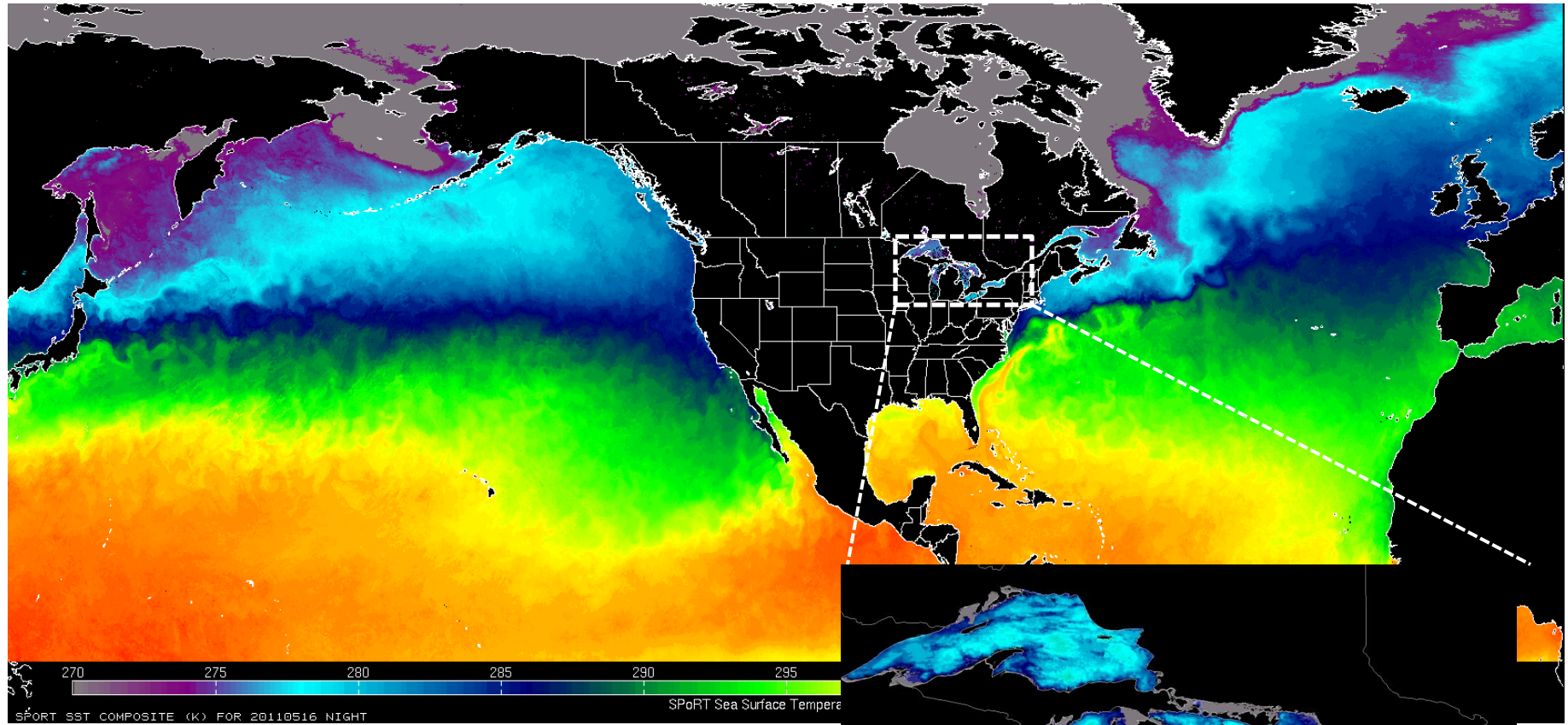
Impact=Large/Noticable/Some

Impact=Little or None

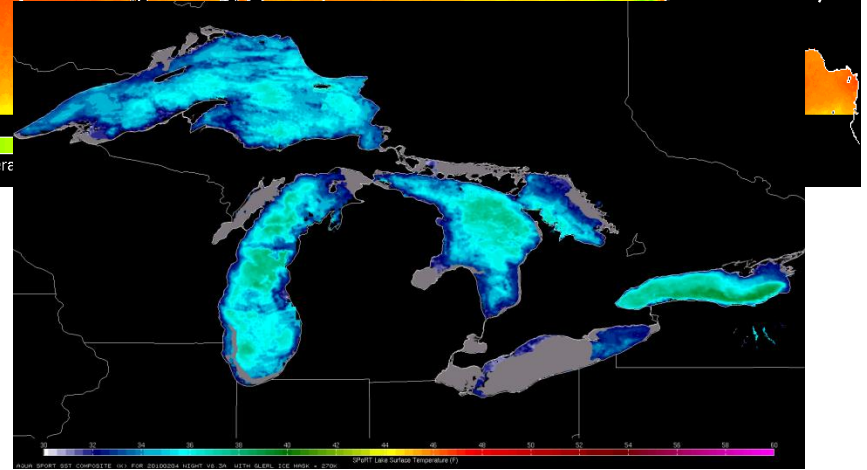
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MODIS - AMSR-E Composite SST – ABI SST “Proxy”



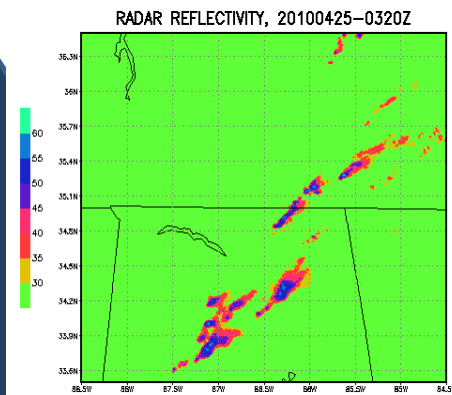
- Composite SST product from multi-day composite of MODIS and AMSR-E
- 1-2 km resolution, 2-4x a day based on Terra/Aqua
- Great Lakes product includes GLERL ice mask
- Available in AWIPS, NAWIPS, KML, GRIB



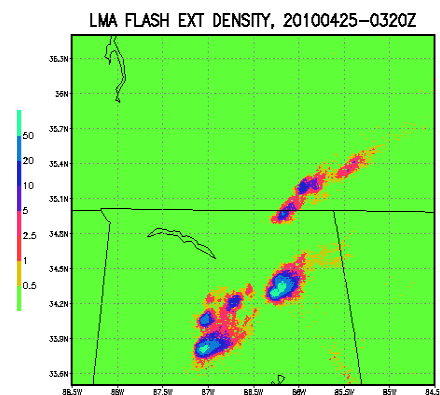
Spring Experiment Products: Lightning Flash Algorithm (LFA)

LFA is forecast total lightning product

- WRF model microphysics proxies
 - Upward graupel flux at -15°C
 - Vertically integrated ice
 - Blend of these two fields
- Aids in future GOES-R data assimilation techniques
- **Incorporated in numerous models**
 - 4-km NSSL WRF runs
 - 4-km SPoRT WRF runs
 - Storm Scale Ensemble Forecast System (~40 members)

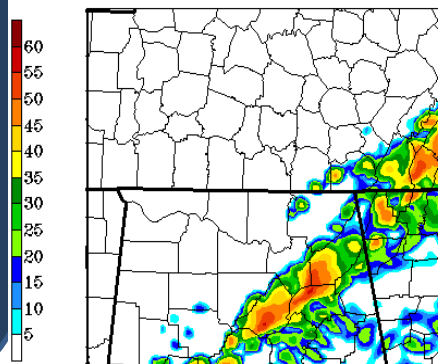


MaxVal=61.33



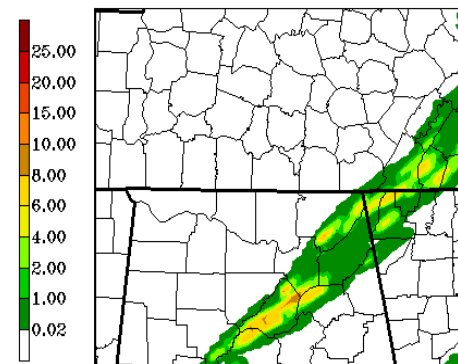
MaxVal=16.95

WRF Composite dBZ valid 100425/0300V027



MaxVal=55.44

Max Hourly LFA

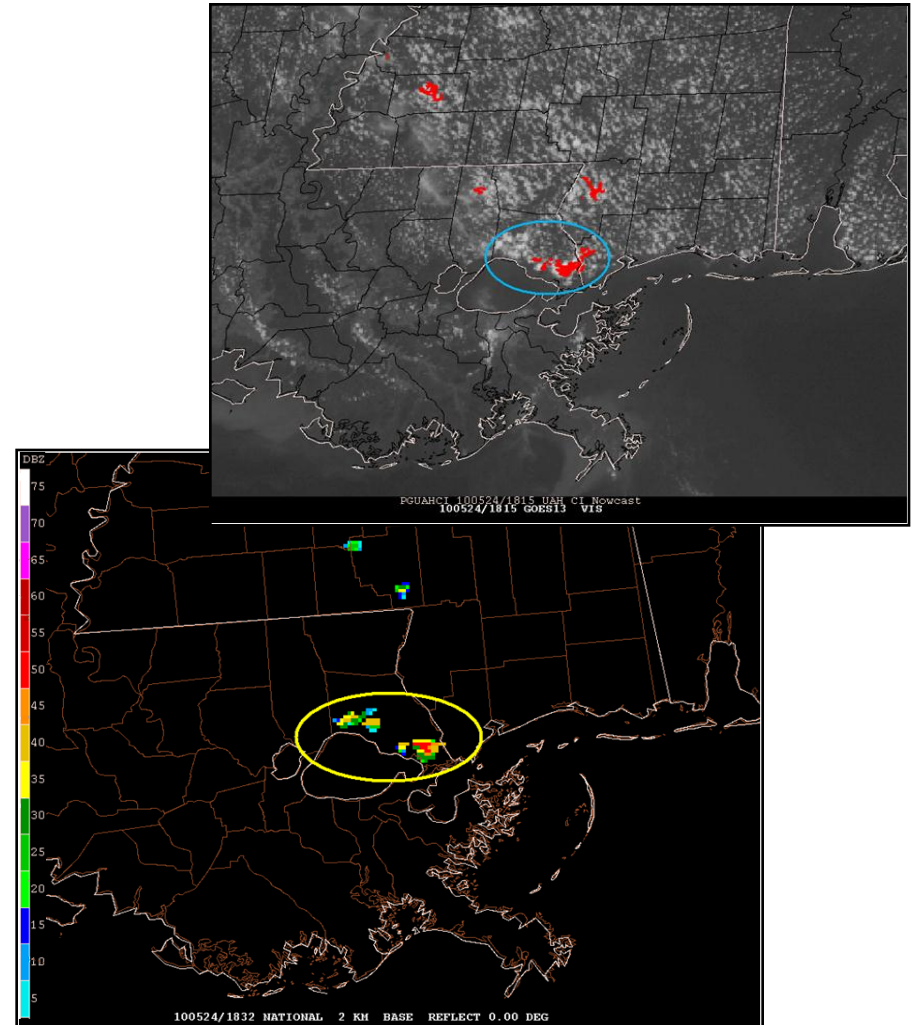


MaxVal=9.88

Spring Experiment: UAH CI Product

SATellite Convection Analysis and Tracking (SATCAST) – Dr. John Mecikalski, John Walker

- Depicts clouds likely to initiate convection within 2 hours
 - Identifies potential convective-form clouds as “objects”
 - Tracks select cloud objects between consecutive images
 - Applies 6 spectral/time differencing tests on objects
 - Provides extended lead-time on CI
- SPoRT disseminates AWG product and assists in training



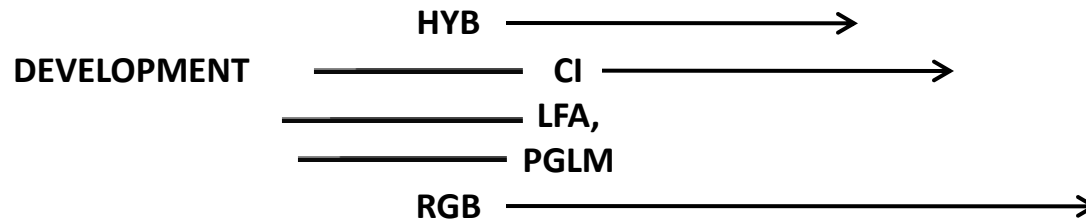
Schedule

OPC, HPC, AWC, SAB

HWT/SPC/SP

NHC

J F M A M J J A S O N D



TRAINING

SST

HYB

CI, LFA,
PGLM
RGB

SST

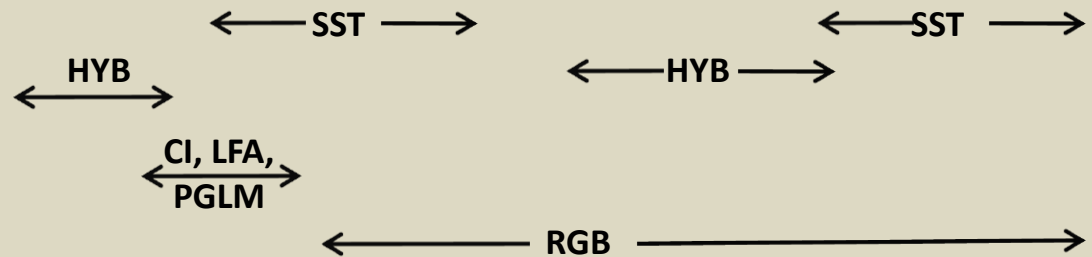
HYB

CI, LFA,
PGLM
RGB

OPERATIONS

RGB

ASSESSMENT

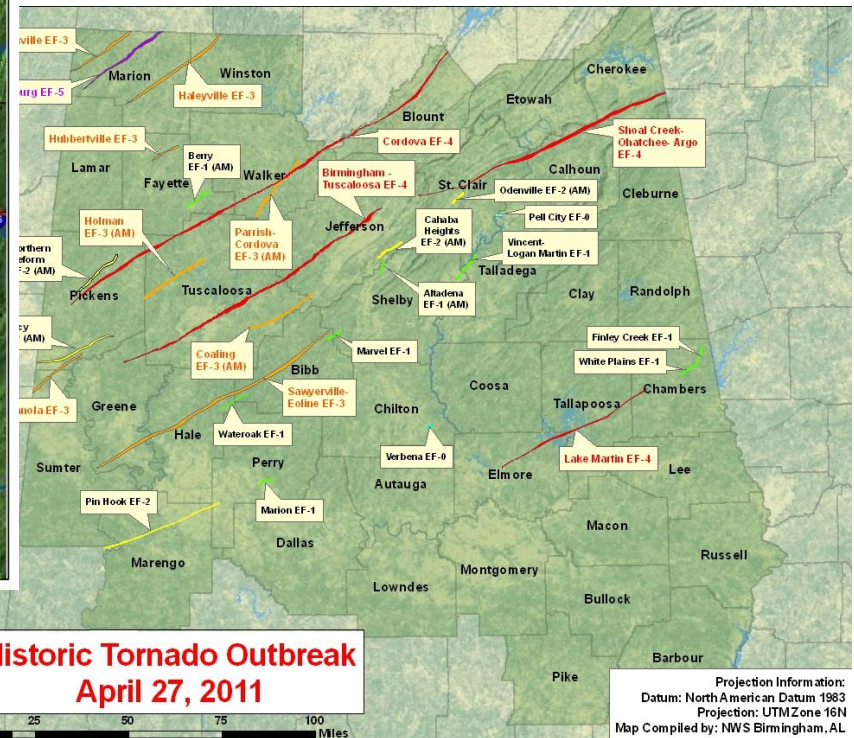
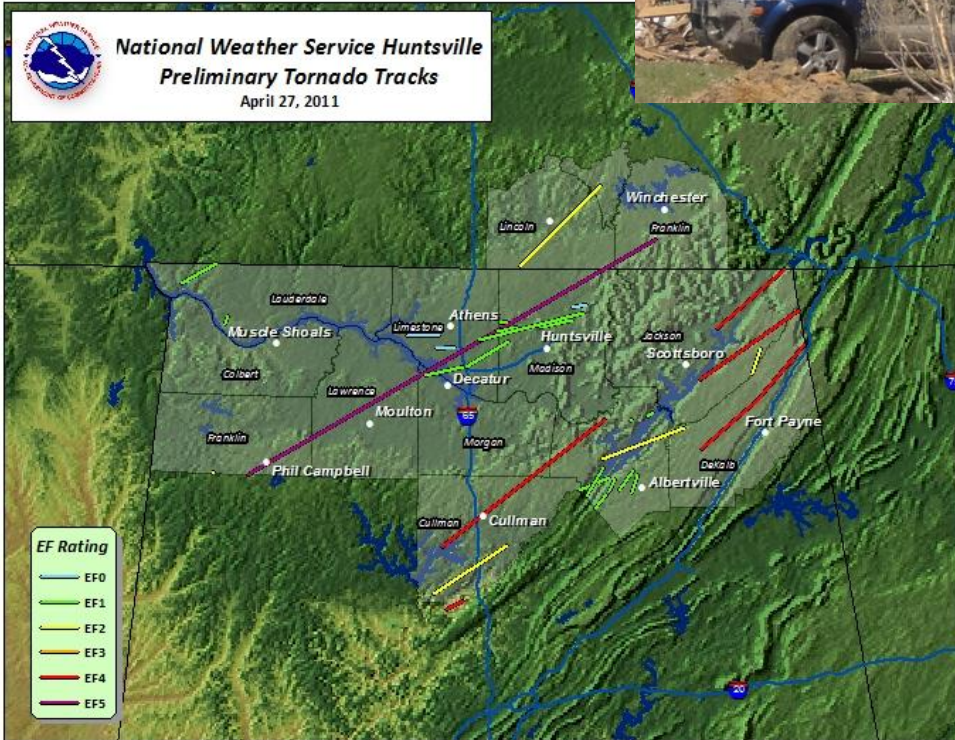


Problems, Issues, and Discussion

Possible discussion topics:

- I perceive PG product training is not well coordinated (each group doing their own thing, not well coordinated with training branch, COMET, etc.).
 - More focused / better organized
 - Clearinghouse / single web site to provide information On PG training
- Broader distribution opportunities of AWG PG products
 - NOT products to more WFOs, but
 - More products to partner WFOs

Historic Tornado Outbreak April 27, 2011



Historic Tornado Outbreak April 27, 2011



Based on techniques of Jedlovec et al. (2006), NWS forecasters use MODIS color composites to evaluate tornado damage tracks

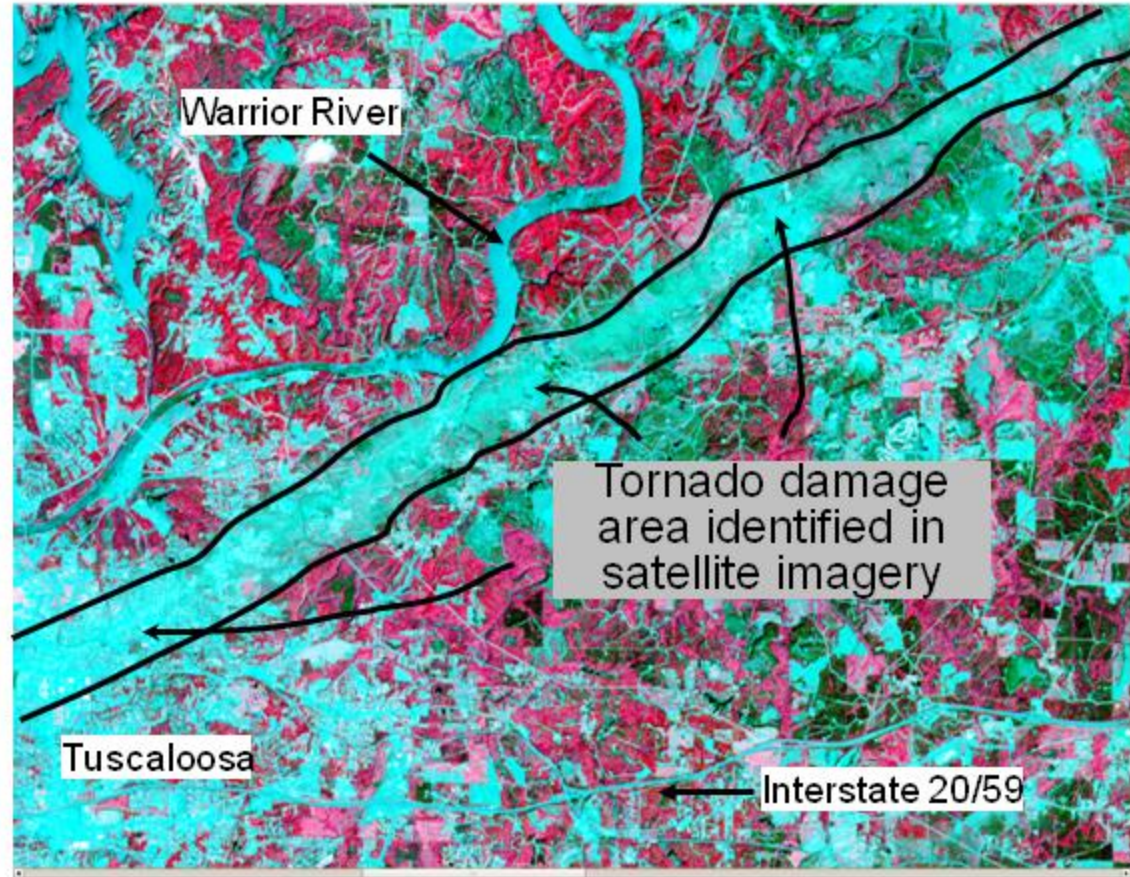
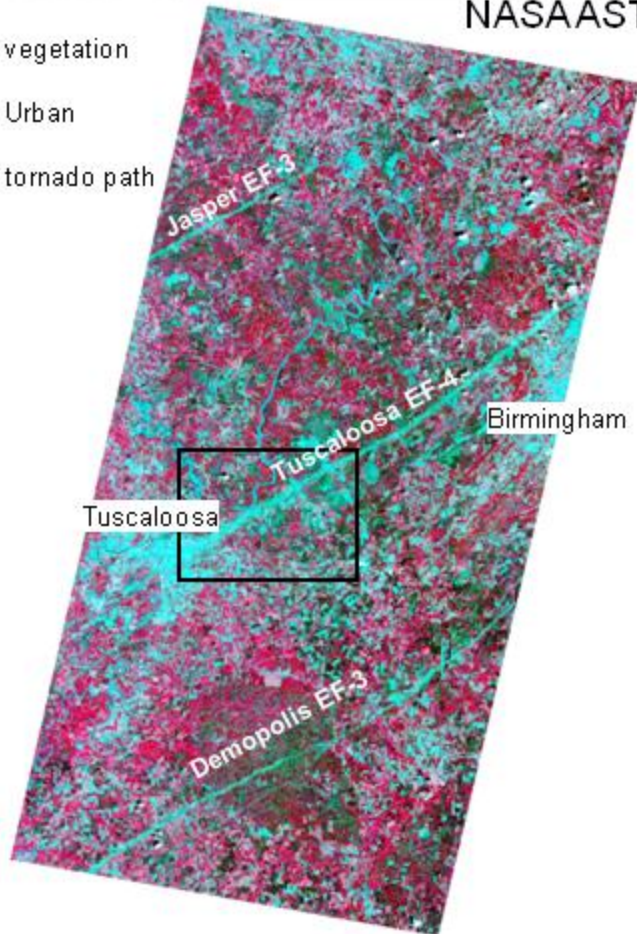
- Guide forecasts to remote locations to conduct surveys
- Correlate damage locations with Doppler radar rotational signatures

Used with high resolution 15m ASTER data for better assessment

Jedlovec, Gary J., Udaysankar Nair, Stephanie L. Haines, 2006: Detection of Storm Damage Tracks with EOS Data. *Wea. Forecasting*, **21**, 249–267. doi: 10.1175/WAF923.1

NASA ASTER Satellite Data - May 4, 2011 - 3 Channel Composite Imagery

- vegetation
- Urban
- tornado path





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